

Name: _____

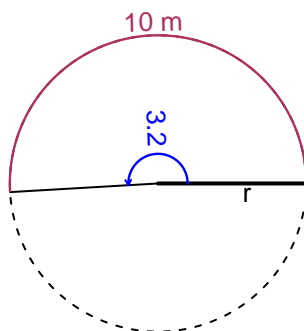
Date: _____

Trig Final (Solution v19)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.2 radians. The arc length is 10 meters. How long is the radius in meters?

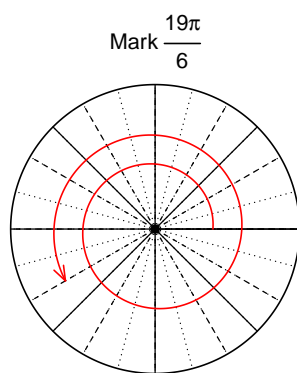


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 3.125$ meters.

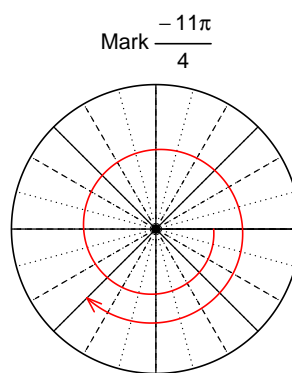
Question 2

Consider angles $\frac{19\pi}{6}$ and $-\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{19\pi}{6}\right)$ and $\sin\left(-\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(19\pi/6)$

$$\cos(19\pi/6) = \frac{\sqrt{3}}{2}$$



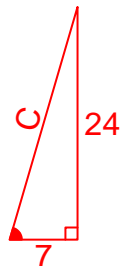
Find $\sin(-11\pi/4)$

$$\sin(-11\pi/4) = -\frac{\sqrt{2}}{2}$$

Question 3

If $\tan(\theta) = \frac{-24}{7}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



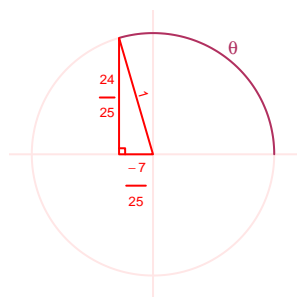
Solve the Pythagorean Equation

$$7^2 + 24^2 = C^2$$

$$C = \sqrt{7^2 + 24^2}$$

$$C = 25$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-7}{25}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.72 Hz, an amplitude of 5.32 meters, and a midline at $y = 2.53$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 5.32 \sin(2\pi 3.72t) + 2.53$$

or

$$y = 5.32 \sin(7.44\pi t) + 2.53$$

or

$$y = 5.32 \sin(23.37t) + 2.53$$